550.6 G4
v. 34

# CONTENTS

Page

Proceedings of the Thirty-fifth Annual Meeting of the Geological Society of America, held at Ann Arbor, Michigan, Thursday-Saturday, December 28-30, 1922; CHARLES P. BERKEY, *Secretary*..... 1
Session of Thursday morning, December 28..... 5
Report of the Council..... 6
Secretary's report..... 6
Treasurer's report..... 9
Editor's report..... 10
Election of Auditing Committee..... 11
Election of officers, members of standing committees, and Fellows 12
Vote on proposed amendment to the Constitution..... 13
Introduction of Correspondent Emmanuel de Margerie..... 14
Report of the representative to the International Geological Congress..... 14
Report of Committee on Teaching Geology..... 14
Necrology..... 15
Memorial of Guy H. Cox (with bibliography); by C. L. DAKE 15
Memorial of Joseph Barrell (with bibliography); by HERBERT E. GREGORY..... 18
The work of Joseph Barrell on problems in sedimentation; by THOMAS WAYLAND VAUGHAN..... 28
Memorial of James E. Todd (with bibliography); by FRANK LEVERETT..... 44
Memorial of Levi Holbrook; by JAMES F. KEMP..... 51
Address of the retiring President..... 52
Session of Thursday afternoon..... 53
Titles of papers presented..... 53
Symposium on the structure and history of mountains and the causes for their development..... 53
Sites and nature of the North American geosynclines; Presidential address by CHARLES SCHUCHERT..... 53
The theory of mountain structure recently set forth by Professor Kober of Vienna; by CHESTER R. LONGWELL..... 53
Asiatic arcs; by WILLIAM H. HOBBS..... 53
The Appalachians; by ARTHUR KEITH..... 53
Eastern Appalachians in the latitude of southern New England; by J. B. WOODWORTH..... 53
Coast Ranges and Sierra Nevadas; by BAILEY WILLIS..... 53
Rocky Mountains of Idaho and Montana; by G. R. MANSFIELD 53
Front ranges of Colorado and New Mexico; by WILLIS T. LEE 54
Session of Thursday evening..... 54
Division of Geology and Geography, National Research Council.. 54
The smoker..... 54
Session of Friday morning, December 29..... 55
Report of the Auditing Committee..... 55
Report on securities..... 56

Page

Titles and abstracts of papers and discussions thereon, presented before the morning session ..... 56
Recent work in France and Switzerland on the structure of the Alps; by EMMANUEL DE MARGERIE ..... 56
A layman's view of the theory of isostasy [abstract and discussion]; by C. K. LEITH ..... 57
Rectilinear shorelines of the New England-Acadian region [abstract]; by DOUGLAS W. JOHNSON ..... 57
Dynamics of faulting and folding [abstract]; by HARRY FIELDING REID ..... 58
Criteria for the recognition of active faults; by STEPHEN TABER ..... 58
Fault map of California [abstract]; by BAILEY WILLIS ..... 58
Faults of the Coast Ranges of California [abstract and discussion]; by BAILEY WILLIS ..... 58
Late Tertiary and Quaternary diastrophism in southern Cebu, Philippine Islands [abstract]; by GEORGE D. LOUDERBACK and R. R. MORSE ..... 59
Parallel folds and boudinage [abstract]; by TERENCE T. QUIRKE ..... 59
Group photograph ..... 60
Luncheon given by the University ..... 60
Sessions of Friday afternoon ..... 60
Sectional meeting of Friday afternoon for Group A ..... 60
Titles and abstracts of papers of Group A and discussions thereon 61
Contributions to the hypothesis of mountain formation; by E. C. ANDREWS ..... 61
Earth's crust and its evolution [abstract and discussion]; by R. A. DALY ..... 61
Orogenic exigencies of a rotary earth [abstract]; by CHARLES R. KEYES ..... 62
Isostasy as a result of earth shrinkage [abstract]; by FRANCIS PARKER SHEPARD ..... 62
Fissility of shale: Some factors concerned in its development [abstract]; by J. VOLNEY LEWIS ..... 63
Development of shrinkage cracks in sediments without exposure to the atmosphere [abstract]; by W. H. TWENHOFEL 64
Observations on the range and distribution of certain types of Canadian Pleistocene concretions [abstract and discussion]; by EDWARD M. KINDLE ..... 64
Boom Beach (Isle-au-Haut, Maine), a sea-mill [abstract and discussion]; by JOHN M. CLARKE ..... 65
Crystalline rocks of the Plains; by CHARLES N. GOULD ..... 66
Precambrian folding in North America; by WILLIAM J. MILLER ..... 66
Notes on the salt domes of North America [abstract]; by E. DE GOLYER ..... 66
Some structural features of northern Idaho [abstract]; by JOSEPH B. UMPLEBY ..... 66

Page

Data on the geographic nomenclature of the southern California and Texas regions [abstract]; by ROBERT T. HILL.. 67
Sectional meeting of Friday afternoon for Group B..... 67
Titles and abstracts of papers of Group B and discussions thereon 67
Successful method of teaching historical geology [abstract]; by GEORGE H. CHADWICK..... 67
Ordovician overlap in the Piedmont of southern Pennsylvania and Maryland; by GEORGE W. STOSE and ANNA I. JONAS 67
Chemung stratigraphy in western New York [abstract]; by GEORGE H. CHADWICK..... 68
Correlation of the Pottsville and Lower Allegheny formations in western Pennsylvania [abstract and discussion]; by B. COLEMAN RENICK..... 68
Structural study of a part of northeast Texas, with some stratigraphic sections [abstract]; by F. JULIUS FOHS and HEATH M. ROBINSON..... 70
The lance problem [abstract]; by FREEMAN WARD..... 71
Observations on coal swamps in northern West Virginia where Permian conditions prevail [abstract]; by JOHN L. TILTON..... 72
Further contributions to the knowledge of the Cretaceous of Texas and northern Mexico [abstract]; by ROBERT T. HILL 72
Paleozoic rocks found in deep wells in Wisconsin and northern Illinois [abstract]; by F. T. THWAITES..... 73
Merging of the Carlile shale and Timpas limestone formations in southeastern Colorado; by H. B. PATTON..... 74
Present status of the geodetic work in the United States and its value to geology [abstract]; by WILLIAM BOWIE..... 74
Reconnaissance traverse from Mojave Ulojane, California, to Rock Creek, Utah [abstract]; by HERBERT E. GREGORY.... 74
Topography and geology of the Okanogan Highlands and Columbia Plateau of Washington [abstract]; by SOLON SHEDD 75
Tertiary stratigraphy in the lower Rio Grande region [abstract]; by ARTHUR C. TROWBRIDGE..... 75
Annual dinner..... 75
Greetings to foreign societies..... 76
Resolutions of appreciation to E. O. Hovey, retiring Secretary... 76
Reply by Edmund Otis Hovey..... 77
Session of Saturday morning, December 30..... 80
Titles and abstracts of papers and discussions thereon, presented before the morning session..... 80
Geological reconnaissance in Mongolia [abstract and discussion]; by CHARLES P. BERKEY..... 80
Problem of mild geological climates [abstract]; by ELLSWORTH HUNTINGTON..... 81
Further experiments on the fracturing of hollow brittle spheres and their bearing on major diastrophism [abstract and discussion]; by WALTER H. BUCHER..... 81

Page

Some structural features of the plains area of Alberta caused by Pleistocene glaciation; by OLIVER B. HOPKINS..... 82
Correspondence between the Gondwana system of Hindustan and the Newark system of the eastern United States [abstract and discussion]; by WILLIAM H. HOBBS..... 82
Quantitative criteria in paleogeography [abstract and discussion]; by RAYMOND C. MOORE..... 85
Keweenaw geothermal gradients and the ice age [abstract]; by ALFRED C. LANE..... 86
Votes of thanks..... 87
Titles and abstracts of papers of Group A and discussions thereon 87
Physical history of the Colorado Front Range [abstract]; by F. M. VAN TUYL and G. W. MACHAMER..... 87
Structural features of the Colorado Plateau and their origin; by RAYMOND C. MOORE..... 88
Structure of the Spring Mountain Range, southern Nevada [abstract]; by D. F. HEWETT..... 89
Pleistocene of northwestern Illinois: a graphic presentation of some of the chief lines of evidence [abstract]; by MORRIS M. LEIGHTON..... 90
Fossiliferous loess beneath tilted Galena dolomite at the border of the Belvidere lobe, in northwestern Illinois [abstract]; by MORRIS M. LEIGHTON..... 90
Late Tertiary and Pleistocene terrace plains of the middle Atlantic Coastal Plain [abstract]; by CHESTER K. WENTWORTH..... 91
Glacial deposits of Missouri and adjacent districts [abstract]; by FRANK LEVERETT..... 91
Glacial drainage on the Columbia Plateau of Washington; by J. HARLEN BRETZ..... 92
Glacial lake problems [abstract]; by GEORGE H. CHADWICK.. 92
Ice action on inland lakes [abstract]; by IRVING D. SCOTT... 92
Banded postglacial clay near New York City [abstract]; by CHESTER A. REEDS..... 92
Origin and history of extinct Lake Calvin, Iowa [abstract]; by WALTER H. SCHOEWE..... 93
Physiography of the Paria River valley, southern Utah [abstract]; by RAYMOND C. MOORE..... 94
Sand rivers of Texas and California and some of their accompanying phenomena [abstract]; by ROBERT T. HILL.... 95
Sedimentation at the mouths of the Mississippi River—preliminary report [abstract]; by ARTHUR C. TROWBRIDGE.... 95
Geological map of the Bushveld complex, Transvaal, South Africa [abstract]; by CHARLES PALACHE..... 95
Titles and abstracts of papers of Group C and discussions thereon 96
Metamorphism of quartzites by the Bushveld igneous complex [abstract]; by FRED. E. WRIGHT..... 96
Fusion of sedimentary rocks in drill-holes [abstract]; by BAILEY WILLIS..... 96

Page

Fusion of sedimentary rocks in drill-holes; by N. L. Bowen and M. Auroussseau ..... 96
Xenoliths in the Stony Creek, Connecticut, granite [discussion]; by James F. Kemp ..... 96
New teaching diagram for igneous rocks; by A. B. Van Esbroeck ..... 97
Aerolite from Rose City, Michigan [abstract]; by Edmund Otis Hovey ..... 97
Origin and formation of certain Appalachian bauxite deposits; by Wilbur A. Nelson ..... 97
Stormberg lavas of South Africa [abstract and discussion]; by Fred. E. Wright ..... 97
A high temperature vein in Madison County, Missouri [abstract]; by W. A. Tarr ..... 99
Cretaceous age and early Eocene uplift of a peneplain in the southern interior of British Columbia and the development of the north Thompson River trench; by W. L. Uglow ..... 99
Study of the igneous rocks of Ithaca, New York, and vicinity [abstract]; by J. H. C. Martens ..... 99
Attempt to study the actual capillary relationships of oil and water [abstract]; by Charles W. Cook ..... 100
Chemical suggestions concerning the origin of Lake Superior copper ores [abstract]; by Roger C. Wells ..... 100
Solvents and precipitants in the Michigan copper lodes [abstract]; by Alfred C. Lane ..... 100
Register of the Ann Arbor meeting, 1922 ..... 101
Reference to Constitution and By-Laws ..... 102
Officers, Correspondents, and Fellows of the Geological Society of America ..... 103
Proceedings of the Twenty-first Annual Meeting of the Cordilleran Section of the Geological Society of America, held at Stanford University, California, April 29, 1922; Austin F. Rogers, *Secretary* ..... 117
Session of April 29 ..... 117
List of officers for 1922 ..... 118
Program of papers ..... 118
Miocene age of the oil shales at Elko, Nevada; by John P. Buwalda ..... 118
Fauna of the Sooke formation; by B. L. Clark and Ralph Arnold ..... 118
Boreal marine fauna from the Upper Oligocene or Lower Miocene of Alaska; by B. L. Clark ..... 118
*Myadesma*, a new genus of *Pelecypoda* from the marine Oligocene of the west coast; by B. L. Clark ..... 118
Eocene *venericardia* of the west coast; by Marcus Hanna .. 118
Phylogeny of the genus *Agasoma;* by H. V. Howe ..... 118
Verde River lake beds near Clarkdale, Arizona; by O. P. Jenkins ..... 119

Page

Prediction of earthquakes; by A. C. LAWSON ..... 119
Pleistocene vertebrates from an asphalt deposit near McKittrick, California; by J. C. MERRIAM and C. STOCK ..... 119
Rock floors in arid regions; by AUGUSTUS LOCKE ..... 119
Geological sketch of the Tsin-ling-shan, China; by R. R. MORSE 119
Morococha mining district; by M. G. EDWARDS ..... 119
Geology of the Alamo mining district, Baja California, Mexico; by C. F. TOLMAN ..... 119
Possible continental links; by BAILEY WILLIS ..... 120
Appointment of Nominating Committee ..... 120
Annual dinner ..... 120
Register of the Stanford meeting, 1922 ..... 120
Proceedings of the Fourteenth Annual Meeting of the Paleontological Society, held at Ann Arbor, Michigan, December 28-30, 1922; R. S. BASSLER, *Secretary* ..... 121
Session of Thursday, December 28 ..... 122
Session of Friday, December 29 ..... 123
Report of the Council ..... 123
Secretary's report ..... 123
Treasurer's report ..... 124
Appointment of Auditing Committee ..... 124
Election of officers and members ..... 124
New members for 1923 ..... 125
Election of representative on National Research Council ..... 126
New business ..... 126
Presentation of papers ..... 126
The Burton Dictyosponge [abstract]; by JOHN M. CLARKE .. 127
Restoration of the Cohoes mastodon [abstract]; by JOHN M. CLARKE ..... 127
Pyorrhœa in the Cohoes mastodon [abstract]; by JOHN M. CLARKE ..... 127
Temple Hill mastodon [abstract]; by JOHN M. CLARKE ..... 127
Pliocene mammals of southern China [abstract]; by W. D. MATTHEW and WALTER GRANGER ..... 128
Early Mississippian formations of the type region along Mississippi River in Iowa, Illinois, and Missouri [abstract]; by RAYMOND C. MOORE ..... 128
Paleobotanical contributions to the stratigraphy of central Oregon [abstract]; by RALPH W. CHANEY ..... 129
Presidential address ..... 130
Recent progress and trends in vertebrate paleontology; Presidential address by W. D. MATTHEW ..... 130
New species of crested Trachodont dinosaur [abstract]; by W. A. PARKS ..... 130
Some faunal correlations of the Richmond [abstract]; by W. H. SHIDELER ..... 130
Relations and overlaps of Ordovician formations in Kentucky and Tennessee; by E. O. ULRICH ..... 131

Page

Stratigraphy of the Snake Creek fossil quarries and the correlation of the faunas [abstract]; by W. D. MATTHEW.... 131
Session of Saturday, December 30.... 132
Embayments and overlaps in central Tennessee [abstract]; by R. S. BASSLER.... 132
The basal Richmond of the Cincinnati Province [abstract]; by W. H. SHIDELER.... 132
Carnivorous Saurischia in Europe later than the Trias; by F. VON HUENE.... 133
Contribution to the Vomer-Parasphenoid question; by F. VON HUENE.... 133
Lines of phyletic and biological development of the Ichthyopterygia; by F. VON HUENE.... 133
Miocene beds about Goshen Hole, Wyoming; by F. B. LOOMIS. 133
Preliminary report concerning some new ostracoderms from Ohio; by J. E. CARMAN.... 133
The problem of fossil multilamellar invertebrates [abstract]; by R. S. BASSLER.... 133
American rhinoceroses and the evolution of Diceratherium; by E. S. TROXELL.... 134
Present status of the Ozarkian and Canadian systems; by E. O. ULRICH.... 134
Marine Eocene horizons of western North America; by BRUCE CLARK.... 134
Sooke formation of southern Vancouver Island; by BRUCE CLARK and RALPH ARNOLD.... 134
Evolution of *Strophcodonta demissa* (Conrad) in the Snyder Creek shales of Missouri [abstract]; by E. B. BRANSON and JAMES S. WILLIAMS.... 134
Register of the Ann Arbor meeting, 1922.... 136
Officers, Correspondents, and Members of the Paleontological Society. 137
Proceedings of the Second Annual Meeting of the Society of Economic Geologists, held at Ann Arbor, Michigan, December 28-30, 1922; SYDNEY H. BALL, *Secretary*.... 143
Session of Thursday, December 28.... 143
Session of Friday, December 29.... 143
Election of officers for 1923.... 143
Presentation of papers.... 143
Session of Saturday, December 30.... 145
Presentation of papers.... 145
Proceedings of the Third Annual Meeting of the Mineralogical Society of America, held at Ann Arbor, Michigan, December 29, 1922; FRANK R. VAN HORN, *Secretary pro tempore*.... 147
Session of Friday, December 29.... 147
Election of officers and Fellows for 1923.... 147
Report of the Secretary.... 148
Report of the Treasurer.... 148
Report of the Editor.... 148

Page

Report of the Committee on the Nomenclature and Classification of Minerals ... 149
Greetings to Professors Groth and Goldschmidt ... 149
Presentation of papers ... 149
Sites and nature of the North American geosynclines; Presidential address by CHARLES SCHUCHERT ... 151
Kober's theory of orogeny; by C. R. LONGWELL ... 231
The Asiatic arcs; by WILLIAM H. HOBBS ... 243
Cross-section of the Appalachians in southern New England; by J. B. WOODWORTH ... 253
Structure of the Rocky Mountains in Idaho and Montana; by G. R. MANSFIELD ... 263
Building of the southern Rocky Mountains, by WILLIS T. LEE; with Notes on isostasy, by C. E. VAN ORSTRAND, and Elastic yielding of the earth's crust under a load of sedimentary deposits, by W. D. LAMBERT ... 285
Outlines of Appalachian structure; by ARTHUR KEITH ... 309
Contribution to the hypothesis of mountain formation; by E. C. ANDREWS 381
Recent progress and trends in vertebrate paleontology; Presidential address by W. D. MATTHEW ... 401
Some structural features of the plains area of Alberta caused by Pleistocene glaciation; by O. B. HOPKINS ... 419
Fusion of sedimentary rocks in drill-holes; by N. L. BOWEN and M. AUROUSSEAU ... 431
Carnivorous Saurischia in Europe since the Triassic; by F. VON HUENE .. 449
Contribution to the vomer-parasphenoid question; by F. VON HUENE ... 459
Lines of phyletic and biological development of the Ichthyopterygia; by F. VON HUENE ... 463
Is the channel of the Missouri River through North Dakota of Tertiary origin?; by J. E. TODD ... 469
Merging of Carlile shale and Timpas limestone formations in southeastern Colorado; by H. B. PATTON ... 495
Glacial lake problems; by G. H. CHADWICK ... 499
Ordovician overlap in the Piedmont province of Pennsylvania and Maryland; by G. W. STOSE and ANNA I. JONAS ... 507
Appalachian bauxite deposits; by W. A. NELSON ... 525
Crystalline rocks of the Plains; by C. N. GOULD ... 541
Cretaceous age and early Eocene uplift of a peneplain in southern British Columbia; by W. L. UGLOW ... 561
Glaciation drainage on the Columbia Plateau; by J. H. BRETZ ... 573
Range and distribution of certain types of Canadian Pleistocene concretions; by E. M. KINDLE ... 609
Boudinage, an unusual structural phenomenon; by T. T. QUIRKE ... 649
Some criteria used in recognizing active faults; by STEPHEN TABER ... 661
The Lake Superior geosyncline; by W. O. HOTCHKISS ... 669
Pre-Cambrian folding in North America; by W. J. MILLER ... 679
Geotherms of Lake Superior copper country; by A. C. LANE ... 703
Cambro-Ordovician section near Mount Robson, British Columbia; by L. D. BURLING ... 721

# ILLUSTRATIONS

## PLATES

Page

Plate 1—DAKE: Portrait of Guy H. Cox ..... 15
" 2—GREGORY: Portrait of Joseph Barrell ..... 18
" 3—LEVERETT: Portrait of James E. Todd ..... 44
" 4—KEITH: Geologic map of Appalachian region ..... 309
" 5—KINDLE: Concretions ..... 648
" 6— " Concretions ..... 648
" 7— " Concretions ..... 648
" 8— " Concretions ..... 648
" 9— " Concretions ..... 648
" 10— " Concretions ..... 648
" 11— " Concretions ..... 648
" 12— " Concretions ..... 648

## FIGURES

SCHUCHERT:

Figure 1—Geosynclines, lands, and oceans or mediterraneans during late Proterozoic time ..... 213
" 2—North America in early Proterozoic time ..... 214
" 3—Borderlands, geosynclines and embayments, and neutral areas of Paleozoic time ..... 215
" 4—Geosynclines of late Lower Cambrian time ..... 216
" 5—Geosynclines and their extensions of Upper Cambrian and Canadian time ..... 217
" 6—Geosynclines and embayments and Arctic Sea of Ordovician time ..... 218
" 7—Geosynclines and embayments and Arctic Sea of Silurian time ..... 219
" 8—Geosynclines, embayments, and their extensions during Devonian time ..... 220
" 9—Cordilleran geosyncline and Mississippian Sea of early Mississippian time ..... 221
" 10—Seas and embayments of late Mississippian time ..... 222
" 11—Seas and coal swamps of early Pennsylvanian time ..... 223
" 12—Cordilleran, Mexican, and Franklinian geosynclines; Mississippian Sea and coal swamps of late Pennsylvanian time ..... 224
" 13—Pacific geosyncline, Arctic and Mexican seas of late Triassic time ..... 225
" 14—Pacific and Mexican geosynclines and Logan Sea of early Upper Jurassic time ..... 226
" 15—Californian, British Columbian, and Mexican geosynclines of Middle Cretaceous (Albian) time ..... 227
" 16—Great Rocky Mountain and narrow Pacific geosynclines and Gulf of Mexico overlap of early Upper Cretaceous time ..... 228

Page

SCHUCHERT:

Figure 17—Great Rocky Mountain and narrow Pacific geosynclines and Gulf of Mexico overlap of late Cretaceous (Pierre) time..... 229

" 18—World chart showing geosynclines and hypothetic continents during Mesozoic time..... 194

LONGWELL:

Figure 1—Schema der Gliederung des alpinen Orogen..... 233

" 2—Blockdiagramm eines normalen (erweiterten) Orogen.. 234

" 3—Schema des Deckenbaues der Ostalpen und Dinariden.. 235

" 4—Blockdiagramm eines mit einen Vorlande einseitig versenkten Orogen..... 236

" 5—Blockdiagramm eines normalen versenkten Orogen, dessen vorlande z, T. stehen geblieben ist..... 237

" 6—Blockdiagramm des japanischen Orogen..... 237

" 7—Blockdiagramm eines samt dem Vorlande versenkten Orogen..... 238

" 8—Schema des Graben-Horsttypus..... 240

" 9—Schema eines gebirges mit massendefekt..... 241

HOBBS:

Figure 1—Contrasted maps and sections of the Asiatic continent.. 248

" 2—Characters of the islands composing the Marianne Arc. 250

" 3—Comparison of the different sections of the Marianne Arc 251

MANSFIELD:

Figure 1—Distribution of the known great overthrusts in the northern Rocky Mountains..... 267

" 2A—Attempted restoration of structure in the Rocky Mountains of southeastern Idaho..... 274

" 2B—northeastern continuation of the section shown in figure 2A, with the Caribou Range at the right..... 275

LEE:

Figure 1—Relation of the interior Cretaceous Basin to the ancestral Rocky Mountains, the Nevada continent, and the present Rockies..... 287

" 2—Diagram illustrating deformation of isogeothermal planes and their relation to erosion..... 293

" 3—Relation of isogeotherms to a sinking earth block..... 294

" 4—Diagram illustrating the relation of erosion to the rise of a mountain block..... 296

" 5—Flow of heat in dike and adjacent rocks..... 301

" 6—Readjustment of solid material under strain..... 303

HOPKINS:

Figure 1—Deep wells of east-central Alberta, western Saskatchewan..... 420

" 2—General view of Tit Hills..... 421

" 3—Sketch map showing geologic structure of Mud Buttes.. 422

" 4—View of Mud Buttes from the southeast..... 423

" 5—Near view of part of Mud Buttes..... 423

Page

HOPKINS:

Figure 6—Close view of Mud Buttes ..... 425
" 7—Close view of Mud Buttes ..... 425
" 8—Near view of Mud Buttes ..... 427
" 9—Near view of Mud Buttes ..... 427
" 10—Development of structure of Mud Buttes ..... 427

BOWEN AND AUBOUSSEAU:

Figure 1—Core barrel from Montezuma well number 1 ..... 432
" 2—Thin-section of fused core, Montezuma well number 1.. 434
" 3—Micrographs of steel from core barrel ..... 439

VON HUENE:

Figure 1—New restoration of *Megalosaurus* (*Streptospondylus*) *cuvieri* ..... 452
" 2—New restoration of *Compsognathus longipes* ..... 454
" 3—Genetic scheme ..... 456

VON HUENE:

Figure 1—*Dicynodon sollasi* Broom, right side ..... 460
" 2—*Dicynodon sollasi* Broom, from below ..... 461

VON HUENE:

Figure 1—New restoration of the skull of *Mesosaurus braziliensis* from the Permian of Irah, Brazil ..... 464
" 2—Scheme of the phylogenetic development of the Ichthyopterygia ..... 466

TODD:

Figure 1—Map of North Dakota ..... 471
" 2—Map of South Dakota ..... 477
" 3—Bijou Hills and gorge of the Missouri ..... 480
" 4—View of East Bijou Hill, part of West Bijou, and the gap between ..... 481
" 5—Panoramic view of the lower Cheyenne River, looking southwest from the upland north of the mouth ..... 482
" 6—View of portion of bouldery margin of Lake Arikaree, with Virgin Butte in the background ..... 485

PATTON:

Figure 1—Part of general section in which transition bed occurs. 496
" 2—Contact of Timpas limestone and Carlile shale ..... 498

CHADWICK:

Figure 1—Evolution of the Laurentian Great Lakes during ice waning ..... 506

STOSE AND JONAS:

Figure 1—Geologic map of northwestern part of the Piedmont province of Pennsylvania and Maryland ..... 508
" 2—Limestone conglomerate at base of Conestoga limestone unconformable on Ledger dolomite ..... 511
" 3—Unconformable contact of limestone conglomerate containing subangular blocks of white marble at base of Conestoga limestone on Ledger dolomite ..... 511

Page

STOSE AND JONAS:

Figure 4—Solution crevice in white marble of the Ledger dolomite filled with limestone breccia at base of Conestoga limestone ..... 512
" 5—Closer view of limestone breccia at base of the Conestoga limestone in solution crevice in white marble of Ledger dolomite ..... 512
" 6—Rapid change in character of sediment of the Conestoga limestone; also bed of conglomerate ..... 513
" 7—Thick-bedded granular dolomite passing into finely laminated impure ribbed limestone typical of the Conestoga limestone ..... 513
" 8—Thick bed of limestone conglomerate with underlying thin-bedded dark calcareous slate of the Conestoga limestone unconformable on massive Ledger dolomite. 515
" 9—Thinly laminated impure limestone characteristic of the Conestoga limestone ..... 515
" 10—Closely folded and fluted gray and white banded micaceous marble of the Conestoga limestone in a small overturned syncline ..... 516
" 11—Fossiliferous beds in the Conestoga limestone ..... 516
" 12—Geologic map of Chester Valley in the vicinity of Coatesville ..... 518
" 13—Geologic map of Chester Valley in the vicinity of Downingtown ..... 519
" 14—Early sedimentation ..... 522
" 15—Early uplift and erosion ..... 522
" 16—Later Ordovician sedimentation and overlap ..... 523
" 17—Later folding, uplift, and erosion ..... 523

NELSON:

Figure 1—Geologic section across Missionary Ridge ..... 529
" 2—Bed of bentonite ..... 530
" 3—Diagrammatic sketch of west side of Isabella Stewart bauxite mine ..... 531
" 4—West side of the present Isabella Stewart bauxite mine 532

GOULD:

Figure 1—Location of occurrences of crystalline rocks on the Plains ..... 542
" 2—Relation of hypothetical Balcones-Arkansas-Ohio Valley line of weakness to adjacent masses; also exposures of igneous rock ..... 546
" 3—Location of buried granite ridges in Kansas, Oklahoma, and Texas; also location of wells which have reached granite ..... 554

UGLOW:

Figure 1—Key map of area studied ..... 563
" 2—Sketch map of portion of North Thompson Trench ..... 565
" 3—North Thompson Trench from Skull Hill ..... 566
" 4—North Thompson River at Chu Chua ..... 567

Page

BRETZ

Figure 1—Glacial drainage features of east-central Washington.. 574
" 2—Steptoe Butte and the maturely dissected Palouse region east of the "Scablands"..... 577
" 3—Channeled "Scabland" of Spokane age..... 578
" 4—Spokane drainage channels in mid-length of Moses Coulee..... 578
" 5—Rock Lake, in a glacial drainage channel of Spokane age 579
" 6—Glacial ice and drainage near Spangle, Washington.... 582
" 7—Post-Spokane talus in "The Potholes" south of Trinidad 591
" 8—Part of Drumheller Channels plexus..... 596
" 9—"The Potholes" near Trinidad, Washington..... 598
" 10—One of "The Potholes"..... 599
" 11—Cliffs of lower Moses Coulee..... 602
" 12—Steamboat rock..... 604

KINDLE:

Figure 1—Generalized Ottawa Pleistocene section..... 622
" 2—Sketch showing two levels of clay pits southwest of Billings Bridge..... 628
" 3—Calcareous root concretions exposed by wind erosion... 630
" 4—Sketch at Rideau Junction, Ontario..... 632

QUIRKE:

Figure 1—Theoretical parallel folding..... 650
" 2—Ideal boudinages..... 651
" 3—Boudinage, Carrière de la Citadelle, Bastogne, Belgium. 652
" 4—Boudinage, Bastogne, Belgium..... 653
" 5—Formation of a boudin by lateral pressure—a rotational strain..... 656
" 6—Recovery, clastic or otherwise, of a boudin, after release of lateral pressure..... 656
" 7—Boudin-like features due to drag-folding and cross-fractures..... 657
" 8—Boudins..... 658
" 9—Phacoidal structure and boudins bounded by schistose rock..... 658

TABER:

Figure 1—Principal faults on the San Francisco peninsula..... 665

MILLER:

Figure 1—Map of North America..... 680

LANE:

Figure 1—Differences from deepest gradient in Michigan..... 705
" 2—Temperatures in Michigan..... 705
" 3—Temperatures in Lake well, West Virginia..... 705

(12 plates; 125 figures.)

## PUBLICATIONS OF THE GEOLOGICAL SOCIETY OF AMERICA

### Regular Publications

The Society issues annually, in four quarterly parts, a single serial octavo publication entitled Bulletin of the Geological Society of America, the edition being 750 copies. A small supply of authors' separates of the longer articles is kept for sale by the Secretary at the prices quoted in each volume.

The Bulletin is sold at the uniform price of ten dollars ($10.00) per volume, with a discount of twenty-five (25) per cent to Fellows of the Society. A discount of ten (10) per cent is allowed to persons residing elsewhere than in North America and public and institutional libraries; carriage extra. Subscriptions are payable in advance. Regular subscribers within the United States of America and its possessions receive their parts, postage paid, as issued. Forty (40) cents per volume must be added to the subscription price to cover postage to other countries in the Postal Union.

The price of the index to volumes 1-10 is $2.25; to volumes 11-20, $3.50, and to volumes 21-30, $4.00; carriage extra. No reduction is made to dealers. Orders should be addressed to the Secretary, whose address is care of Columbia University, New York, N. Y., and drafts and money orders should be made payable to *The Geological Society of America*.

### Description of the Published Volumes

| Volumes. | Pages. | Plates. | Figures. |
|---|---|---|---|
| Vol. 1, 1889 | 593 + xii | 13 | 51 |
| Vol. 2, 1890 | 622 + xiv | 23 | 63 |
| Vol. 3, 1891 | 541 + xi | 17 | 72 |
| Vol. 4, 1892 | 458 + xi | 10 | 55 |
| Vol. 5, 1893 | 655 + xii | 21 | 43 |
| Vol. 6, 1894 | 528 + x | 27 | 40 |
| Vol. 7, 1895 | 558 + x | 24 | 61 |
| Vol. 8, 1896 | 446 + x | 51 | 29 |
| Vol. 9, 1897 | 460 + x | 29 | 49 |
| Vol. 10, 1898 | 534 + xii | 54 | 83 |
| Index to volumes 1–10 | 209 | .. | .. |
| Vol. 11, 1899 | 651 + xii | 58 | 37 |
| Vol. 12, 1900 | 538 + xii | 45 | 28 |
| Vol. 13, 1901 | 583 + xii | 58 | 47 |
| Vol. 14, 1902 | 609 + xii | 65 | 43 |
| Vol. 15, 1903 | 636 + x | 59 | 16 |
| Vol. 16, 1904 | 636 + xii | 94 | 74 |
| Vol. 17, 1905 | 785 + xiv | 84 | 96 |
| Vol. 18, 1906 | 717 + xii | 74 | 59 |
| Vol. 19, 1907 | 617 + x | 41 | 31 |
| Vol. 20, 1908 | 749 + xiv | 111 | 35 |
| Index to volumes 11–20 | 422 | ... | .. |
| Vol. 21, 1909 | 823 + xvi | 54 | 109 |
| Vol. 22, 1910 | 747 + xii | 31 | 66 |
| Vol. 23, 1911 | 758 + xvi | 43 | 44 |
| Vol. 24, 1912 | 737 + xviii | 36 | 60 |
| Vol. 25, 1913 | 802 + xviii | 28 | 47 |
| Vol. 26, 1914 | 504 + xxi | 27 | 41 |
| Vol. 27, 1915 | 739 + xviii | 30 | 55 |
| Vol. 28, 1916 | 1005 + xxii | 48 | 102 |
| Vol. 29, 1917 | 679 + xix | 22 | 67 |
| Vol. 30, 1918 | 644 + xiii | 15 | 40 |
| Index to volumes 21–30 | 325 | .. | .. |
| Vol. 31, 1919 | 450 + xviii | 14 | 7 |
| Vol. 32, 1920 | 488 + xviii | 12 | 60 |
| Vol. 33, 1921 | 862 + xxi | 5 | 115 |
| Vol. 34, 1922 | 748 + xx | 12 | 125 |

PARTS OF VOLUME 34

| | PAGES. | PLATES. | FIGURES. | PRICE TO FELLOWS. | PRICE TO PUBLIC. |
|---|---|---|---|---|---|
| Number 1 | 1–150 | 1–3 | .. | $1.60 | $2.40 |
| Number 2 | 151–400 | 4 | 38 | 2.55 | 3.85 |
| Number 3 | 401–648 | 5–12 | 73 | 2.70 | 4.05 |
| Number 4* | 649–748 | .... | 14 | 1.00 | 1.50 |

REPRINTS FOR VOLUME 34

| REPRINTS. | PAGES. | PLATES. | FIGURES. | PRICE TO FELLOWS. | PRICE TO PUBLIC. |
|---|---|---|---|---|---|
| Proceedings of the Thirty-fifth Annual Meeting of the Geological Society of America, held at Ann Arbor, Michigan, Thursday-Saturday, December 28-30, 1922. C. P. BERKEY, *Secretary* | 1–116 | 1–3 | .... | $1.25 | $1.85 |
| Proceedings of the Twenty-first Annual Meeting of the Cordilleran Section of the Geological Society of America, held at Stanford University, California, April 29, 1922. A. F. ROGERS, *Secretary* | 117–120 | .... | .... | .10 | .15 |
| Proceedings of the Fourteenth Annual Meeting of the Paleontological Society, held at Ann Arbor, Michigan, December 28-30, 1922. R. S. BASSLER, *Secretary*† | 121–142 | .... | .... | .20 | .30 |
| Proceedings of the Second Annual Meeting of the Society of Economic Geologists, held at Ann Arbor, Michigan, December 28-30, 1922. S. H. BALL, *Secretary* | 143–146 | .... | .... | .10 | .15 |
| Proceedings of the Third Annual Meeting of the Mineralogical Society of America, held at Ann Arbor, Michigan, December 29, 1922. F. R. VAN HORN, *Secretary pro tempore* | 147–150 | .... | .... | .10 | .15 |
| The work of Joseph Barrell on Problems in sedimentation. T. WAYLAND VAUGHAN | 28–44 | .... | .... | .20 | .30 |
| Sites and nature of the North American geosynclines. CHARLES SCHUCHERT | 151–230 | .... | 17 | .80 | 1.20 |
| Kober's theory of Orogeny. C. R. LONGWELL | 231–242 | .... | 9 | .10 | .15 |
| The Asiatic arcs. W. H. HOBBS | 243–252 | .... | 3 | .10 | .15 |
| Cross-section of the Appalachians in southern New England. J. B. WOODWORTH | 253–262 | .... | .... | .10 | .15 |

* Preliminary pages and index are distributed with number 4.

† Under the brochure heading is printed PROCEEDINGS OF THE PALEONTOLOGICAL SOCIETY.

| REPRINTS. | PAGES. | PLATES. | FIGURES. | PRICE TO FELLOWS. | PRICE TO PUBLIC. |
|---|---|---|---|---|---|
| Structure of the Rocky Mountains in Idaho and Montana. G. R. MANSFIELD | 263–284 | .... | 2 | $0.20 | $0.30 |
| Building of the southern Rocky Mountains. W. T. LEE | 285–308 | .... | 6 | .25 | .40 |
| Outlines of Appalachian structure. A. KEITH | 309–380 | 4 | .... | .75 | 1.15 |
| Contribution to the hypothesis of mountain formation. E. C. ANDREWS | 381–400 | .... | .... | .20 | .30 |
| Recent progress and trends in vertebrate paleontology.† W. D. MATTHEW | 401–418 | .... | .... | .20 | .30 |
| Some structural features of the Plains area of Alberta caused by Pleistocene glaciation. O. B. HOPKINS | 419–430 | .... | 10 | .10 | .15 |
| Fusion of sedimentary rocks in drill-holes. N. L. BOWEN and M. AUROUSSEAU | 431–448 | .... | 3 | .20 | .30 |
| Carnivorous Saurischia in Europe since the Triassic.† F. VON HUENE | 449–458 | .... | 3 | .10 | .15 |
| Contribution to the vomer-parasphenoid question.† E. VON HUENE | 459–462 | .... | 2 | .10 | .15 |
| Lines of phyletic and biological development of the Ichthyopterygia.† F. VON HUENE | 463–468 | .... | 2 | .10 | .15 |
| Is the channel of the Missouri River through North Dakota of Tertiary origin? J. E. TODD | 469–494 | .... | 6 | .25 | .40 |
| Merging of Carlile shale and Timpas limestone formations in southeastern Colorado. H. B. PATTON | 495–498 | .... | 2 | .10 | .15 |
| Glacial lake problems. G. H. CHADWICK | 498–506 | .... | 1 | .10 | .15 |
| Ordovician outcrop in the Piedmont province of Pennsylvania and Maryland. G. W. STOSE and ANNA I. JONAS | 507–524 | .... | 17 | .20 | .30 |
| Appalachian bauxite deposits. W. A. NELSON | 525–540 | .... | 4 | .15 | .25 |
| Crystalline rocks of the Plains. C. N. GOULD | 541–560 | .... | 3 | .20 | .30 |
| Cretaceous age and early Eocene uplift of a peneplain in southern British Columbia. W. L. UGLOW | 561–572 | .... | 4 | .10 | .15 |
| Glacial drainage on the Columbia Plateau. J. H. BRETZ | 573–608 | .... | 12 | .35 | .55 |

† Under the brochure heading is printed PROCEEDINGS OF THE PALEONTOLOGICAL SOCIETY.

| Reprints. | Pages. | Plates. | Figures. | Price to Fellows. | Price to Public. |
|---|---|---|---|---|---|
| Range and distribution of certain types of Canadian Pleistocene concretions. E. M. Kindle.... | 609–648 | 5–12 | 4 | $0.60 | $0.90 |
| Boudinage, an unusual structural phenomenon. T. T. Quirke... | 649–660 | .... | 9 | .10 | .15 |
| Some criteria used in recognizing active faults. Stephen Taber. | 661–668 | .... | 1 | .10 | .15 |
| The Lake Superior geosyncline. W. O. Hotchkiss..... | 669–678 | .... | .... | .10 | .15 |
| Pre-Cambrian folding in North America. W. J. Miller..... | 679–702 | .... | 1 | .25 | .40 |
| Geotherms of Lake Superior copper country. A. C. Lane..... | 703–720 | .... | 3 | .20 | .30 |
| Cambro-Ordovician section near Mount Robson, British Columbia. L. D. Burling..... | 721–748 | .... | .... | .30 | .45 |

### Irregular Publications

In the interest of exact bibliography, the Society takes cognizance of all publications issued wholly or in part under its auspices. Each author of a memoir receives 40 copies without cost, and is permitted to order any additional number at a slight advance on cost of paper and presswork; and these reprints are identical with those of the editions issued and distributed by the Society; but the cover bears only the title of the paper, the author's name, and the statement [Reprinted from the Bulletin of the Geological Society of America, vol. —, pp. —, pl. — (Date)]. Contributors to the Proceedings and "Abstracts of Papers" are also authorized to order any number of separate copies of their papers at a slight advance on cost of paper and presswork; but such separates are bibliographically distinct from the reprints issued by the Society.

*Regular Editions*

| | | | | | |
|---|---|---|---|---|---|
| Pages | 151–380, | plate 4, | 50 | copies. | June 30, 1923. |
| " | 151–230, | | 260 | " | " 30, 1923. |
| " | 231–242, | | 50 | " | " 30, 1923. |
| " | 243–252, | | 50 | " | " 30, 1923. |
| " | 253–262, | | 100 | " | " 30, 1923. |
| " | 263–284, | | 200 | " | " 30, 1923. |
| " | 285–308, | | 140 | " | " 30, 1923. |
| " | 309–380, | plate 4, | 210 | " | " 30, 1923. |
| " | 381–400, | | 50 | " | " 30, 1923. |
| " | 401–418,*† | | 360 | " | September 30, 1923. |
| " | 419–430, | | 50 | " | " 30, 1923. |
| " | 431–448, | | 600 | " | " 30, 1923. |
| " | 449–458,*† | | 310 | " | " 30, 1923. |
| " | 459–462,*† | | 310 | " | " 30, 1923. |
| " | 463–468,*† | | 310 | " | " 30, 1923. |
| " | 469–494, | | 75 | " | " 30, 1923. |
| " | 495–498, | | 50 | " | " 30, 1923. |
| " | 499–506, | | 150 | " | " 30, 1923. |
| " | 507–524, | | 150 | " | " 30, 1923. |
| " | 525–540, | | 250 | " | " 30, 1923. |
| " | 541–560, | | 110 | " | " 30, 1923. |

| | | | | | |
|---|---|---|---|---|---|
| Pages | 561–572 | | 50 | copies. | September 30, 1923. |
| " | 573–608, | | 50 | " | " 30, 1923. |
| " | 609–648, | plates 5–12, | 85 | " | " 30, 1923. |
| " | 649–660, | | 150 | " | December 30, 1923. |
| " | 661–668, | | 150 | " | " 30, 1923. |
| " | 669–678, | | 250 | " | " 30, 1923. |
| " | 679–702, | | 50 | " | " 30, 1923. |
| " | 703–720, | | 850 | " | " 30, 1923. |
| " | 721–748, | | 50 | " | " 30, 1923. |

*Special Editions* ‡

| | | | | | |
|---|---|---|---|---|---|
| Pages | 15– 18, | plate 1, | 50 | copies. | March 30, 1923. |
| " | 18– 28, | plate 2, | 110 | " | " 30, 1923. |
| " | 28– 44, | | 210 | " | " 30, 1923. |
| " | 44– 50, | plate 3, | 50 | " | " 30, 1923. |
| " | 68– 69, | | 250 | " | " 30, 1923. |
| " | 117–120, | | 50 | " | " 30, 1923. |
| " | 121–142,*† | | 150 | " | " 30, 1923. |
| " | 143–146, | | 50 | " | " 30, 1923. |
| " | 147–150, | | 50 | " | " 30, 1923. |

## CORRECTIONS AND INSERTIONS

Contributors to volume 34 have been invited to send corrections and insertions to be made in their papers, and the volume has been scanned with some care by the Editor. The following are such corrections and insertions as are deemed worthy of attention:

Page 111, line 1 from top, *for* "Molengraaf" *read* Molengraaff

" 113, line 17 from top, *for* "Christ Church, Canterbury College," *read* Canterbury College, Christ Church

" 116, Summary, *for* "Original Fellows 25," *read* "Original Fellows 26"

" 116, Summary, *for* "Membership 488," *read* "Membership 489"

" 146, line 4 from top, *omit* word "iron"

" 270, footnote 19, *for* "Manuscript submitted for publication," etc., *substitute* Bull. Am. Assoc. Pet. Geologists, vol. vii, 1923, pp. 1-13

" 413, footnote 40, *insert* after "no." 78, May 25, 1923

" 432, line 2 of figure title, *for* "contests" *read* contents

" 435, bottom line, *for* "proportoin" *read* proportion

" 506, explanation of figure 1, the finer vertical lines represent the "division-lines crossed by drainage"

" 515, title of figure 8, line 3, *for* "Ledger dolomite" *read* Vintage dolomite

---

* Bearing on the cover

PROCEEDINGS OF THE PALEONTOLOGICAL SOCIETY.

[Reprinted from the Bulletin of the Geological Society of America, vol. ——, pp. ——, pls. ——, (Date).]

† Under the brochure heading is printed PROCEEDINGS OF THE PALEONTOLOGICAL SOCIETY.

‡ Bearing imprint [From BULL. GEOL. SOC. AM., VOL. 34, 1922.]

# INDEX TO VOLUME 34


Page

AEROLITE from Rose City, Michigan; E. O. Hovey ..... 97
AFRICA, Diamond mines of South ..... 150
—, Geological map of the Bushveld complex, Transvaal ..... 95
—, Jurassic dinosaurs of ..... 405
—, Lavas of South ..... 97
—, Permian faunas of ..... 403
—, Schoepite from the Congo ..... 150
AFRICAN Protectorate, Vanadium deposits from southwest ..... 150
AGASOMA, Phylogeny of the genus ..... 118
A HIGH temperature vein in Madison County, Missouri; W. A. Tarr ..... 99
ALAMO mining district, Mexico ..... 119
ALASKA, Boreal marine fauna from ..... 118
A LAYMAN'S view of the theory of isostasy; C. K. Leith ..... 57
ALBAN Hills, Occurrence of leucite in the ..... 150
ALBERTA, Cretaceous dinosaurs of ..... 407
—, Effect of Pleistocene glaciation in ..... 82
—, Pleistocene glaciation in ..... 419
ALDRICH, H. R.; Magnetic surveying on the copper-bearing rocks of Wisconsin ..... 145
ALLEGHENY formation in western Pennsylvania ..... 68
AMERICA, Cenozoic mammals of ..... 408
AMERICAN rhinoceroses and the evolution of Deceratherium; E. S. Troxell ..... 134
AN effect of climatic change on the superficial alteration of ore deposits; H. H. Knox ..... 146
ANDREWS, E. C.; Contribution to the hypothesis of mountain-building 61, 381
—; Geographic distribution of ore deposits in Australia ..... 144
ANNUAL dinner ..... 75
APPALACHIAN bauxite deposits; W. A. Nelson ..... 97, 525
— structure, Outlines of ..... 309
APPALACHIANS in southern New England, Cross-section of ..... 253
ARIZONA, Verde River lake beds in ..... 119
ARNOLD, RALPH, and B. L. CLARK; Fauna of the Sooke formation ..... 118
ASIATIC arcs; W. H. Hobbs ..... 53, 243
A SOURCE of pressure for ore formation; L. C. Graton ..... 146
ATLANTIC Coastal Plain, Tertiary and Pleistocene terrace plains of ..... 91
— States native copper deposits compared with those of Michigan ..... 145
ATTEMPT to study the actual capillary relationships of oil and water; C. W. Cook ..... 100
AUDITING Committee, Election of ..... 11
— — of the Geological Society, Report of the ..... 55
— — — — Paleontological Society, Appointment of ..... 124
AUROUSSEAU, M., and N. L. BOWEN; Fusion of sedimentary rocks in drill holes ..... 96, 431
AUSTRALIA, Ore deposits in ..... 144
AUTUNITE of the uranite group ..... 150

BALL, SYDNEY H., *Secretary;* Proceedings of the Second Annual Meeting of the Society of Economic Geologists, held at Ann Arbor, Michigan, December 28-30, 1922 ..... 143

Page

BANDED postglacial clay near New York City; C. A. Reeds ..... 92
BARRELL, JOSEPH, Memorial of ..... 18
—; Work on problems in sedimentation 28
BASSLER, R. S.; Embayments and overlaps in central Tennessee ..... 132
—, *Secretary;* Proceedings of the Fourteenth Annual Meeting of the Paleontological Society, held at Ann Arbor, Michigan, December 28-30, 1922 ..... 121
—; The problem of fossil multilamellar invertebrates ..... 133
BATEMAN, A. M.; Primary chalcocite, Bristol copper mine, Connecticut .. 146
BAUXITE deposits in the Appalachians. 97, 525
BAYLEY, W. S.; Titaniferous iron ores of western North Carolina ..... 146
BEAN, E. F.; Road materials investigation in Wisconsin ..... 146
BENTONITE deposits in the Appalachians 525
BERKEY, C. P.; Geological reconnaissance in Mongolia ..... 80
—, *Secretary;* Proceedings of the Thirty-fifth Annual Meeting of the Geological Society of America, held at Ann Arbor, Michigan, Thursday-Saturday, December 28-30, 1922 1
BOLIVIAN and Michigan copper deposits compared ..... 145
BOOM Beach (Isle-au-haut, Maine): A sea-mill; J. M. Clarke ..... 65
BOREAL marine fauna from the Upper Oligocene or Lower Miocene of Alaska; B. L. Clark ..... 118
BOUDINAGE, an unusual structural phenomenon; T. T. Quirke ..... 649
—, Parallel folds and ..... 59
BOWEN, N. L., and M. AUROUSSEAU; Fusion of sedimentary rocks in drill holes ..... 96, 431
BOWIE, WILLIAM; Present status of the geodetic work in the United States and the value to geology ..... 74
BRANSON, E. B., and J. S. WILLIAMS; Evolution of *Strophcodonta demissa* (Conrad) in the Snyder Creek shales of Missouri ..... 134
BRETZ, J. H.; Glacial drainage in the Columbia Plateau ..... 92, 573
BRISTOL copper mine, Connecticut, Chalcocite from ..... 146
BRITISH COLUMBIA Cambro-Ordovician section ..... 721
— —, Cretaceous age and early Eocene uplift of a peneplain in ..... 99, 561
BUCHER, W. H.; Further experiments on the fracturing of hollow brittle spheres and their bearing on major diastrophism ..... 81
BUILDING of the southern Rocky Mountains; W. T. Lee ..... 285
BURLING, L. D.; Cambro-Ordovician section near Mount Robson, British Columbia ..... 721
BURTON Dictyosponge ..... 127
BUSHVELD complex, Geological map of. 95
— igneous complex, Metamorphism of quartzites by the ..... 96
BUTLER, B. S.; Suggested explanation of the high ferric iron content of limestone contact zones ..... 146

Page

BUWALDA, J. P.; Miocene age of the oil fields at Elko, Nevada..... 118

CALIFORNIA, Fault map of..... 58
—, Faults of the coast ranges of..... 58
—, Geographic nomenclature of southern ..... 67
—, Pleistocene vertebrates from California asphalt deposit..... 119
—, Reconnaissance traverse from Mojave Ulojane..... 74
—, Sand rivers of..... 95
CALVIN Lake, Iowa, Origin and history of ..... 93
CAMBRO-ORDOVICIAN section near Mount Robson, British Columbia; L. D. Burling ..... 721
CANADA, Cretaceous dinosaurs of Alberta ..... 407
—, Ellsworthite from Hybla, Ontario.. 150
—, Pleistocene glaciation in Alberta... 415
CANADIAN and Ozarkian systems..... 134
— Pleistocene concretions..... 609
CAPILLARY relationships of oil and water ..... 100
— relations of oil and water; C. W. Cook ..... 145
CARLILE shale and Timpas limestone, Merging of..... 495
— — — of Colorado..... 74
CARMAN, J. E.; Preliminary report concerning some new Ostracoderms from Ohio..... 133
CARNIVOROUS Saurischia in Europe later than the Trias; F. von Huene 133
— — — — — since the Triassic; F. von Huene ..... 449
CARNOTITE of the uranite group..... 150
CATAPELITE from Magnet Cove; W. F. Foshag ..... 149
CEBU, Tertiary and Quaternary diastrophism in..... 59
CENOZOIC mammals of America..... 408
CHADWICK, G. H.; Glacial lake problems ..... 92, 499
—; Chemung stratigraphy in western New York..... 68
—; Successful method of teaching historical geology..... 67
CHANEY, R. W.; Paleobotanical contributions to the stratigraphy of central Oregon..... 129
CHEMICAL suggestions concerning the origin of Lake Superior copper ores; R. C. Wells..... 100, 144
CHEMUNG stratigraphy in western New York; G. H. Chadwick..... 68
CHINA, Geological sketch of the Tsinling-shan ..... 119
—, Pliocene mammals of southern..... 128
CHALCOCITE from Bristol copper mine, Connecticut ..... 146
CINCINNATI province, Basal Richmond of the..... 132
CLARK, B. L.; Boreal marine fauna from the Upper Oligocene or Lower Miocene of Alaska..... 118
—; Myadesma, a new genus of pelecypoda from the marine Oligocene of the west coast..... 118
— and RALPH ARNOLD; Fauna of the Sooke formation..... 118
CLARK, BRUCE; Marine Eocene horizons of western North America..... 134
CLARKE, J. M.; Boom Beach (Isle-au-haut): A sea-mill..... 65
—; Pyorrhea in the Cohoes mastodon.. 127
—; Restoration of the Cohoes mastodon 127
—; Temple Hill mastodon..... 127
—; The Burton Dictyosponge..... 127

Page

CLARKE, N. T.; Restoration of mastodon by..... 127
CLIMATES, Problem of mild geological. 81
COAST ranges and Sierra Nevados; Bailey Willis..... 53
— — of California, Faults of..... 58
COHOES mastodon..... 127
COLORADO and Wyoming oil-bearing rocks, Correlation of..... 145
— Front Range, Physical history of... 87
—, Merging of Carlile shale and Timpas limestone formation in..... 74, 495
— Plateau, Origin and structural features of..... 88
COLUMBIA Plateau, Glacial drainage on the ..... 573
— — of Washington, Glacial drainage on ..... 92
— —, Topography and geology of..... 75
COMMITTEE, Appointment of Paleontological Society's Auditing..... 124
— of Cordilleran Section on Nominations ..... 120
— on Teaching Geology, Report of.... 14
COMPOSITION of Thomsonite; E. T. Wherry ..... 150
CONCENTRATION and circulation of the elements from the standpoint of economic geology; Presidential address by W. Lindgren..... 144
CONCRETIONS, Canadian Pleistocene... 64
CONGO, Schoepite from the..... 150
CONNECTICUT chalcocite..... 146
— granite, Xenoliths in the Stony Creek ..... 96
CONSTITUTION of Geological Society, Amendment of..... 13
CONTINENTAL links, Possible..... 120
CONTRIBUTION to the hypotheses of mountain formation; E. C. Andrews ..... 61, 381
— — — vomer-parasphenoid question; F. von Huene..... 133, 459
COOK, C. W.; Attempt to study the actual capillary relationships of oil and water..... 100
—; Capillary relations of oil and water 145
COPPER-BEARING rocks of Wisconsin.... 145
COPPER deposits of Michigan..... 144
— — — — and Bolivia compared..... 145
— — — — southern Atlantic States compared ..... 145
— — — New Jersey and Michigan contrasted ..... 145
— ores of Lake Superior, Origin of 100, 144
—, Solvents and precipitants of metallic 144
CORRELATION of oil-bearing rocks in Colorado and Wyoming; W. T. Lee 145
— — the Pottsville and lower Allegheny formations in western Pennsylvania; B. C. Renick..... 68
CORRESPONDENCE between the Gondwana system of Hindustan and Newark system of the eastern United States; W. H. Hobbs..... 82
COUNCIL of the Geological Society, Report of..... 6
COUNCIL'S report of Paleontological Society ..... 123
COX, GUY H., Memorial of..... 15
CRETACEOUS age and early Eocene uplift of a peneplain in the southern interior of British Columbia and the development of the North Thompson River trench; W. L. Uglow ..... 99, 561
— dinosaurs of Alberta, Montana, and New Mexico..... 407
— of Texas and northern Mexico..... 72
CRITERIA by which to determine the direction of faults; Bailey Willis... 144

Page

CRITERIA for the recognition of active faults; Stephen Taber..... 58
CROSS-SECTION of the Appalachians in southern New England; J. B. Woodworth ..... 253
CRYSTALLINE rocks of the plains; C. N. Gould ..... 66, 541
CRYSTALLOGRAPHY and optical properties of a uranium mineral (schoepite) from the Congo; T. L. Walker 150

DAKE, C. L.; Memorial of Guy H. Cox. 15
DALY, R. A.; Earth's crust and its evolution ..... 61
DATA on the geographic nomenclature of the southern California and Texas regions; R. T. Hill..... 67
DE GOLYER, E.; Notes on the salt domes of North America..... 66
DELAWARE, Hisingerite from..... 149
DE MAGERIE EMMANUEL, Introduction of ..... 14
—; Recent work in France and Switzerland ..... 56
DEVELOPMENT of shrinkage cracks in sediments without exposure to the atmosphere; W. H. Twenhofel.... 64
DIAMOND mines of South Africa; C. Palache ..... 150
DICERATHERIUM, Evolution of..... 134
DICTYOSPONGE, The Burton..... 127
DINNER, Annual..... 75
— of Cordilleran Section, Annual..... 120
DINOSAUR, New species of crested trachodont ..... 130
DINOSAURS not a natural order..... 408
— of Alberta, Montana, and New Mexico ..... 407
— — Utah and East Africa..... 405
DRILL-HOLES, Fusion of sedimentary rocks in..... 96, 431
DYNAMICS of faulting and folding; Bailey Willis..... 58

EARLY Mississippian formations of the type region along Mississippi River, in Iowa, Illinois, and Missouri; R. C. Moore..... 128
EARTH, Orogenic exigencies of a rotary 62
— shrinkage ..... 62
EARTHQUAKES, Prediction of..... 119
EARTH'S crust and its evolution; R. A. Daly ..... 61
— — under load of sedimentary deposits ..... 305
EAST AFRICA, Jurassic dinosaurs of... 405
EASTERN Appalachians in the latitude of southern New England; J. B. Woodworth (printed in this volume under the title "Cross-section of the Appalachians in southern New England") ..... 53
EDITOR of the Mineralogical Society, Report of the..... 148
EDITOR'S report to the Geological Society ..... 10
EDWARDS, M. G.; Morococha mining district ..... 119
ELASTIC yielding of the earth's crust under a load of sedimentary deposits; W. D. Lambert..... 305
ELECTION of Auditing Committee..... 11
— — officers and Fellows of the Mineralogical Society..... 147
— — — — members of Paleontological Society ..... 124
— — — —, members of standing committees, and Fellows..... 12
— — — of Cordilleran Section..... 118
— — — — the Society of Economic Geologists ..... 143

Page

ELKO, Nevada, Oil shales at..... 118
ELLSWORTHITE, New hydrous uranium columbate from Hybla, Hastings County, Ontario; T. L. Walker and A. L. Parsons..... 150
EMBAYMENTS and overlaps in central Tennessee; R. S. Bassler..... 132
EOCENE horizons of North America.... 134
— uplift of peneplain in southern British Columbia..... 99, 561
— venericardia of the west coast; Marcus Hanna..... 118
EVOLUTION of *Strophodonta demissa* (Conrad) in the Snyder Creek shales of Missouri; E. B. Branson and J. S. Williams..... 134

FAULT map of California; Bailey Willis 58
FAULTING, Dynamics of..... 58
FAUNA from Alaska, Boreal marine.... 118
— of the Sooke formation; B. L. Clark and Ralph Arnold..... 118
FAULTS, Criteria determining direction of ..... 144
— — for recognition of active..... 58
— of the coast ranges of California; Bailey Willis..... 58
FELLOWS of Geological Society, Election of ..... 12
FISSILITY of shale: some factors concerned in the development; J. V. Lewis ..... 63.
FOHS, F. J., and H. M. ROBINSON; Structural study of a part of northeast Texas with some stratigraphic sections..... 70
FOLDING, Dynamics of..... 58
FORMATION of kaolin at moderate depths; A. L. Parsons..... 149
FOSHAG, W. F.; Catapelite from Magnet Cove..... 149
FOSSILIFEROUS loess beneath tilted Galena dolomite at the border of the Belvidere lobe, in northwestern Illinois ..... 90
FOSSIL multilamellar invertebrates.... 133
— quarries of Snake Creek, Stratigraphy and correlation of faunas of.. 131
FOSSILS: American rhinoceroses and evolution of Dicerotherium..... 134
—: Burton Dictyosponge..... 127
—: Carnivorous Saurischia in Europe. 133, 449
—: Cohoes mastodon..... 127
—: Ichthyopterygia ..... 133
—: Miocene beds about Goshen Hole, Wyoming ..... 133
—: New genus of Pelecypoda from west coast..... 118
—: New ostracoderms from Ohio..... 133
— — species of crested trachodont dinosaur ..... 130
—: Phyllitic and biological development of the Ichthyopterygia..... 463
—; Pliocene mammals of southern China ..... 128
—: Richmond of the Cincinnati province ..... 132
—: Temple Hill mastodon..... 127
—: Vertebrates from California asphalt deposit ..... 119
FRANCE, Recent geological work in Alps of ..... 56
FRONT ranges of Colorado and New Mexico; W. T. Lee (printed in this volume under the title "Building of the southern Rocky Mountains") 54
FUNCTIONS of the division of geology and geography, National Research Council, Round table discussion of the ..... 54

Page

FURTHER contributions to the knowledge of the Cretaceous of Texas and northern Mexico; R. T. Hill.. 72
— experiments on the fracturing of hollow brittle spheres and their bearing on major diastrophism; W. H. Bucher..... 81
FUSION of sedimentary rocks in drill-holes; N. L. Bowen and M. Aurousseau ..... 96, 431

GALENA dolomite in northeastern Illinois ..... 90
GENETIC comparison of the Michigan and Bolivian copper deposits; J. T. Singewald, Jr..... 145
GEODETIC work in the United States, Status of..... 74
GEOGRAPHIC distribution of ore deposits in Australia; E. C. Andrews..... 144
GEOLOGICAL sketch of the Tsin-ling-shan, China; R. R. Morse..... 119
— map of the Bushveld complex, Transvaal, South Africa; C. Palache... 95
— reconnaissance in Mongolia; C. P. Berkey ..... 80
GEOLOGY of the Alamo mining district, Baja, California, Mexico; C. F. Tolman ..... 119
GEOSYNCLINE, Lake Superior..... 669
GEOSYNCLINES of North America..... 53
— — — —, Sites and nature of..... 151
GEOTHERMS of Lake Superior copper country; A. C. Lane..... 703
GERMANY, Triassic reptilian fauna of.. 405
GLACIAL deposits of Missouri and adjacent districts; F. Leverett..... 91
— drainage on the Columbia Plateau; J. H. Bretz..... 92, 573
— lake problems; G. H. Chadwick. 92, 499
GLACIATION in Alberta, Structural features caused by..... 419
GOLDSCHMIDT, VICTOR, Mineralogical Society's greetings to..... 149
GONDWANA system of Hindustan..... 82
GOSHEN Hole, Wyoming, Miocene beds about ..... 133
GOULD, C. N.; Crystalline rocks of the plains ..... 66, 541
GRANGER, W., and W. D. MATTHEW; Pliocene mammals of southern China ..... 128
GREETINGS of the Mineralogical Society to Professors Groth and Goldschmidt ..... 149
GREGORY, HERBERT E., Memorial of Joseph Barrell..... 18
—; Reconnaissance traverse from Mojave Ulojane, California, to Rock Creek, Utah..... 74
GROTH, PAUL, Greetings of Mineralogical Society to..... 149
GROTON, L. C.; A source of pressure for ore formation..... 146
—; Native copper deposits of Michigan 144
GROUP photograph..... 60
GROUT, F. F.; Ladder veins in Minnesota ..... 146
—; Magnetite pegmatites in northern Minnesota ..... 146

HANNA, MARCUS; Eocene Venericardia of the west coast..... 118
HAWKINS, A. C.; Hisingerite from Delaware ..... 149
HEIDENREICH, C. P.; Restoration of mastodon by..... 127
HEWETT, D. F.; Structure of the Spring Mountain Range, southern Nevada 89
HILL, R. T.; Data on the geographic nomenclature of the southern California and Texas regions..... 67

Page

HILL, R. T.; Further contributions to the knowledge of the Cretaceous of Texas and northern Mexico..... 72
—; Sand rivers of Texas and California and some of their accompanying phenomena..... 95
HISINGERITE from Delaware; A. C. Hawkins ..... 149
HISTORICAL geology, Successful method of teaching..... 67
HOBBS, W. H.; Asiatic arcs..... 53
—; Correspondence between the Gondwana of Hindustan and Newark system of the eastern United States 82
—; The Asiatic arcs..... 243
HOFFMAN, R., and A. WANDKE; Rock alteration in contact with sulphides at Sudbury, Ontario..... 146
HOLBROOK, LEVI, Memorial of..... 51
HOMESTAKE ore body..... 144
HOPKINS, O. B.; Some structural features of the plains area of Alberta caused by Pleistocene glaciation.. 82, 419
HOTCHKISS, W. O.; Some considerations relating to the origin and history of the Lake Superior syncline ..... 144
—; The Lake Superior geosyncline.... 669
HOWE, H. V.; Phylogeny of the genus Agasoma ..... 118
HOVEY, E. O.; Aerolite from Rose City, Michigan ..... 97
—, Remarks in reply to resolution by.. 77
—, retiring Secretary, Resolution of appreciation of..... 76
HUNT, WALTER F., Vote of thanks to.. 87
HUNTINGTON, ELLSWORTH; Problem of mild geological climates..... 81
HYBLA, Ontario, Ellsworthite from.... 150
HYPOTHESIS of mountain formation... 381

ICE age, Keweenaw geothermal gradients and the..... 86
— action on inland lakes; I. D. Scott.. 92
ICHTHYOPTERGIA, Phyletic and biological development of the..... 133, 463
IDAHO, Structure of Rocky Mountains of ..... 53, 263
—, Some structural features in northern ..... 66
IGNEOUS rocks of Ithaca, New York... 99
— —, New teaching diagram for..... 97
ILLINOIS, Fossiliferous loess in northwestern ..... 90
—, Mississippian formations in..... 128
—, Paleozoic rocks found in deep wells in ..... 73
—, Pleistocene of northwestern..... 90
INLAND lakes, Ice action on..... 92
IOWA, Extinct Lake Calvin in..... 93
—, Mississippian formations in..... 128
IRON ores of western North Carolina.. 146
ISOMORPHISM in the silicates, Volume. 150
ISOSTASY as a result of earth shrinkage; F. P. Shepard..... 62
—, Layman's view of..... 57
—, Notes on..... 300
Is the channel of the Missouri River through North Dakota of Tertiary origin?; J. E. Todd..... 469
ITALY, Leucite in the Alban Hills of... 150

JENKINS, O. P.; Verde River lake beds near Clarkdale, Arizona..... 119
JOHNSON, D. W.; Rectilinear shorelines of the New England—Acadian region ..... 57
JONAS, ANNA I., and G. W. STOSE; Ordovician overlap in the Piedmont Province of Pennsylvania and Maryland..... 67, 507

Page

JURASSIC dinosaurs of Utah and East Africa ..... 405

KAOLIN, Formation at moderate depths of ..... 149
KEITH, ARTHUR; Outlines of Appalachian structure..... 309
—; The Appalachians (printed in this volume under the title "Outlines of Appalachian structure")..... 53
KEMP, JAMES F., Memorial of Levi Holbrook ..... 51
—; Xenoliths in the Stony Creek, Connecticut, granite..... 96
KENTUCKY Ordovician formations in... 131
KEWEENAW geothermal gradients and the ice age; A. C. Lane..... 86
KEYES, CHARLES; Orogenic exigencies of a rotary earth..... 62
KINDLE, E. M.; Observations on the range and distribution of certain types of Canadian Pleistocene concretions ..... 64
—; Range and distribution of certain types of Canadian Pleistocene concretions ..... 609
KNOX, H. H.; An effect of climatic change on the superficial alteration of ore deposits..... 146
KOBER'S theory of orogeny; C. R. Longwell ..... 231
KRAUS, E. H.; Use of projection apparatus in teaching certain phases of mineralogy..... 150

LADDER veins in Minnesota; F. F. Grout 146
LAKE Superior copper country, Geotherms of..... 703
— — — ores, Origin of..... 100, 144
— — geosyncline ..... 669
— — syncline, Origin of..... 145
LAMBERT, W. D.; Elastic yielding of the earth's crust under a load of sedimentary deposits..... 305
LANCE problem..... 71
LANE, A. C.; Geotherms of Lake Superior copper country..... 703
—; Keweenaw geothermal gradients and the ice age..... 86
—; Solvents and precipitants in the Michigan copper lodes..... 100
—; Solvents and precipitants of metallic copper..... 144
LATE Tertiary and Pleistocene terrace plains of the middle Atlantic Coastal Plain; C. K. Wentworth.. 91
— — — Quaternary diastrophism in southern Cebu, Philippine Islands; G. D. Louderback and R. R. Morse 59
LAWSON, A. C.; Prediction of earthquakes ..... 119
LEAD region of South Dakota, Structural features in the..... 144
LEE, W. T.; Building of the southern Rocky Mountains..... 285
—; Correlation of oil-bearing rocks in Colorado and Wyoming..... 145
—; Front ranges of Colorado and New Mexico (printed in this volume under the title "Building of the southern Rocky Mountains")..... 54
LEIGHTON, M. M.; Fossiliferous loess beneath Galena dolomite at the border of the Belvidere lobe, in northwestern Illinois..... 90
—; Pleistocene of northwestern Illinois: a graphic presentation of some of the chief lines of evidence 90
LEITH, C. K.; A layman's view of the theory of isostasy..... 57
LEUCITE in the Alban Hills, Occurrence of ..... 150

Page

LEVERETT, F.; Glacial deposits of Missouri and adjacent districts..... 91
—, Memorial of James E. Todd..... 44
LEWIS, J. V.; Fissility of shale: some factors concerned in its development ..... 63
—; Similarities and contrasts between native copper deposits of New Jersey and of Michigan..... 145
LIMESTONE contact zones, High ferric content of..... 146
—, Metallic sulphides in..... 149
LINDGREN, W.; Concentration and circulation of the elements from the standpoint of economic geology; Presidential address by..... 144
LINES of phyletic and biological development of the Ichthyopterygia; F. von Huene..... 133, 463
LOCKE, A.; Rock flows in arid regions. 119
LOESS in northwestern Illinois, Fossiliferous ..... 90
LONGWELL, C. R.; Kober's theory of orogeny ..... 231
—; The theory of mountain structure recently set forth by Professor Kober, of Vienna (printed in this volume under title "Kober's theory of orogeny")..... 53
LOOMIS, F. B.; Miocene beds about Goshen Hole, Wyoming..... 133
LOUDERBACK, G. D., and R. R. MORSE; Late Tertiary and Quaternary diastrophism in southern Cebu, Philippine Islands..... 59

MACHAMER, G. W., and F. M. VAN TUYL; Physical history of the Colorado Front Range..... 87
MAGNET Cove, Catapeiite from..... 149
MAGNETIC surveying on the copper-bearing rocks of Wisconsin; H. R. Aldfich ..... 145
MAGNETITE pegmatites in northern Minnesota; F. F. Grout..... 146
MAINE: Sea-mill at Boom Beach..... 65
MAN and primates..... 410
MANSFIELD, G. R.; Rocky Mountains of Idaho and Montana (printed in this volume under the title "Structure of the Rocky Mountains of Idaho and Montana")..... 53
—; Structure of the Rocky Mountains of Idaho and Montana..... 263
MARINE Eocene horizons of western North America; Bruce Clark..... 134
MARTENS, J. W. C.; Study of the igneous rocks of Ithaca, New York, and vicinity..... 99
MARYLAND, Ordovician overlap in..... 507
—, Ordovician overlap in Piedmont of. 67
MASTODON from Cohoes, New York.... 127
— — Temple Hill, New York..... 127
MATTHEW, W. D., and W. GRANGER; Pliocene mammals of southern China ..... 128
—; Recent progress and trends in vertebrate paleontology; Presidential address by..... 130, 401
—; Stratigraphy of the Snake Creek fossil quarries and the correlation of the faunas..... 131
MERGING of the Carlile shale and Timpas limestone formations in southeastern Colorado; H. B. Patton.. 74, 495
MEMORIAL of Guy H. Cox; C. L. Dake. 15
— — James E. Todd; Frank Leverett.. 44
— — Joseph Barrell; Herbert E. Gregory ..... 18
— — Levi Holbrook; James F. Kemp.. 51

Page

MERRIAM, J. C., and C. STOCK; Pleistocene vertebrates from an asphalt deposit near McKittrick, California ..... 119
METAMORPHISM of quartzites by Bushveld igneous complex; F. E. Wright 96
MEXICO, Alamo mining district of..... 119
—, Cretaceous of..... 72
MICHIGAN and Bolivian copper deposits compared ..... 145
— — New Jersey copper deposits contrasted ..... 145
— copper deposits compared with those of southern Atlantic States..... 145
— — lodes, Solvents and precipitants in 100
—, Native copper deposits of..... 144
—, Rose City aerolite..... 97
MILLER, W. J.; Pre-Cambrian folding in North America..... 66, 679
MINERALOGRAPHY as an aid to milling; Ellis Thomson..... 149
MINERALOGY, Use of projection apparatus in teaching..... 150
MINERALS: Appalachian bauxite deposits ..... 525
MINNESOTA, Ladder veins in..... 146
—, Magnetite pegmatites in..... 146
MIOCENE age of the oil shales at Elko, Nevada; J. P. Buwalda..... 118
— beds about Goshen Hole, Wyoming; F. B. Loomis..... 133
— boreal marine fauna from Alaska... 118
MISSISSIPPI River, Sedimentation at the mouths of the..... 95
MISSISSIPPIAN formations in Iowa, Illinois, and Missouri..... 128
MISSOURI, Evolution of *Stropheodonta demissa* (Conrad) in Snyder Creek shales of..... 134
—, Glacial deposits of..... 91
—, High temperature vein in..... 99
—, Mississippian formations in..... 128
— River channel through North Dakota, Origin of..... 469
MOJAVE Ulojane, California, Reconnaissance traverse from..... 74
MONGOLIA, Geological reconnaissance in 80
MONTANA, Cretaceous dinosaurs of.... 407
—, Structure of Rocky Mountains of.. 53, 263
MOORE, R. C.; Early Mississippian formations of the type region along Mississippi River, in Iowa, Illinois, and Missouri..... 128
—; Quantitative criteria in paleogeography ..... 85
—; Physiography of the Paria River Valley, southern Utah..... 94
—; Structural features of the Colorado Plateau and their origin..... 88
MOROCOCHA mining district; M. G. Edwards ..... 119
MORSE, R. R.; Geological sketch of the Tsin-ling-shan, China..... 119
— and G. D. LOUDERBACK; Late Tertiary and Quaternary diastrophism in southern Cebu, Philippine Islands ..... 59
MOTHER plants of petroleum; David White ..... 145
MOUNTAIN formation, Hypothesis of 61, 381
MOUNT Robson Cambro-Ordovician section ..... 721
MULTILAMELLAR invertebrates..... 133
MYADESMA, a new genus of Pelecypoda from the marine Oligocene of the west coast; B. L. Clark..... 118

NATIVE copper deposits of Michigan; L. C. Graton..... 144

Page

NATIVE copper deposits of the southern Atlantic States as compared especially with those of Michigan; T. L. Watson ..... 145
NATIONAL Research Council, Election of representative on..... 126
— — —, Functions of the Division of Geology and Geography of the.... 54
NECROLOGY ..... 15
NELSON, W. A.; Appalachian bauxite deposits ..... 525
—; Origin and formation of certain Appalachian bauxite deposits..... 97
NEVADA, Oil shales at Elko..... 118
—, Spring Mountain Range of southern 89
NEWARK system of United States corresponds to Gondwana of Hindustan 82
NEW ENGLAND, Cross-section of Appalachian in southern..... 253
NEW ENGLAND-ACADIAN region, Shorelines of the..... 57
NEW JERSEY and Michigan copper deposits contrasted..... 145
NEW MEXICO, Cretaceous dinosaurs of. 407
NEW species of crested trachodont dinosaur; W. A. Parks..... 130
— teaching diagram for igneous rocks; A. B. Van Esbroeck..... 97
NEW YORK, Chemung stratigraphy in western ..... 68
—, Igneous rocks of Ithaca..... 99
—, Postglacial banded clay near city of 92
NOMENCLATURE of southern California and Texas regions, Geographic.... 67
NOMINATING Committee of Cordilleran Section ..... 120
NORTH AMERICA, Geosynclines of..... 53
— —, Marine Eocene horizons of western ..... 134
— —, Pre-Cambrian folding in..... 679
— —, Sites and nature of geosynclines of ..... 151
NORTH CAROLINA, Titaniferous iron ores of ..... 146
NORTH DAKOTA, Origin of Missouri River channel through..... 469
NORTH Thompson River trench, British Columbia ..... 99
NOTES on isostasy; C. E. Van Orstrand 300
— — the salt domes of North America; E. De Golyer..... 66

OBSERVATIONS on coal swamps in northern West Virginia where Permian conditions prevail; J. L. Tilton... 72
— — the range and distribution of certain types of Canadian Pleistocene concretions; E. M. Kindle..... 64
OCCURRENCE of leucite in the Alban Hills; H. S. Washington..... 150
OFFICERS and Fellows of Mineralogical Society, Election of..... 147
— — — — Paleontological Society, Election of..... 124
— of Cordilleran Section, Election of.. 118
—, correspondents, and Fellows of the Geological Society..... 103
— — — members of the Paleontological Society ..... 137
— of Geological Society, Election of... 12
— — the Society of Economic Geologists, Election of..... 143
OHIO, New ostracoderms from..... 133
OIL and water, Capillary relations of.. 100, 145
— shales at Elko, Nevada..... 118
OKANOGAN Highlands, Topography and geology of..... 75
OLIGOCENE marine fauna from Alaska. 118
—, New genus of Pelecypoda from west coast marine..... 118

Page

OLIGOCENE of west coast, New genus of Pelecypoda from..... 118
ONTARIO, Ellsworthite from Hybla.... 150
—, Rock alteration at Sudbury..... 146
ORDOVICIAN formations in Kentucky and Tennessee..... 131
— overlap in the Piedmont Province of Pennsylvania and Maryland; G. W. Stose and Anna I. Jonas..... 67, 507
ORE deposits, Effect of climatic change on ..... 146
— — in Australia..... 144
— formation, Source of pressure of... 146
OREGON, Stratigraphy of central..... 129
ORIGIN and formation of certain Appalachian bauxite deposits; W. A. Nelson ..... 97
— — history of extinct Lake Calvin, Iowa; W. H. Schoewe..... 93
OROGENIC exigencies of a rotary earth; Charles Keyes..... 62
OROGENY, Kober's theory of..... 231
OSTRACODERMS from Ohio, New..... 133
OUTLINES of Appalachian structure; Arthur Keith..... 309
OZARKIAN and Canadian systems..... 134

PAIGE, SIDNEY: The Homestake orebody 144
PALACHE, C.; Diamond mines of South Africa ..... 150
—; Geological map of the Bushveld complex, Transvaal, South Africa. 95
—; Vanadium deposits of the southwest African protectorate..... 150
PALEOBOTANICAL contributions to the stratigraphy of central Oregon; R. W. Chaney..... 129
PALEOGEOGRAPHY, Quantitative criteria in ..... 85
PALEOZOIC reptiles..... 403
— rocks found in deep wells in Wisconsin and northern Illinois; F. T. Thwaite ..... 73
PARALLEL folds and boudinage; T. T. Quirke ..... 59
PARIA River Valley, Physiography of.. 94
PARKS, W. A.; New species of crested trachodont dinosaur..... 130
PARSONS, A. L.; Formation of kaolin at moderate depths..... 149
— and T. L. WALKER; Ellsworthite, New hydrous uranium columbate from Hybla, Hastings County, Ontario ..... 150
PATTON, H. B.; Merging of the Carlile shale and Timpas limestone formations in southeastern Colorado. 74, 495
PEGMATITES in northern Minnesota.... 146
PELECYPODA, A new genus of..... 118
PENNSYLVANIA, Ordovician overlap in Piedmont of southern..... 67, 507
PERMIAN conditions in West Virginia.. 72
— faunas of Texas and South Africa... 403
PETROLEUM, Mother plants of..... 145
PHILIPPINE Islands, Tertiary and Quaternary diastrophism in..... 59
PHILLIPS, A. H.; Possible source of metallic sulphides in limestone.... 149
PHYLOGENY of the genus Agasoma; H. V. Howe..... 118
PHYSICAL history of the Colorado Front Range; F. M. Van Tuyl and G. W. Machamer ..... 87
PHYSIOGRAPHY of the Paria River Valley, southern Utah; R. C. Moore.. 94
PLAINS, Crystalline rocks of the..... 541
PLEISTOCENE concretions, Canadian 64, 609
— glaciation in Alberta..... 419
— — — —, Certain effects of..... 82
— of northwestern Illinois: A graphic presentation of some of the chief lines of evidence; M. M. Leighton. 90

Page

PLEISTOCENE terrace plains of the middle Atlantic Coastal Plains..... 91
— vertebrates from an asphalt deposit near McKittrick, California; J. C. Merriam and C. Stock..... 119
PLIOCENE mammals of southern China; W. D. Matthew and W. Granger.. 128
POSSIBLE continental links; Bailey Willis ..... 120
— source of metallic sulphides in limestone; A. H. Phillips..... 149
POST-GLACIAL banded clay near New York City..... 92
POTTSVILLE formation in western Pennsylvania ..... 68
PIEDMONT Province of Pennsylvania and Maryland, Ordovician overlap in the..... 507
PRECAMBRIAN folding in North America; W. J. Miller..... 66, 679
PRECIPITANTS and solvents in Michigan copper lodes..... 100
PREDICTION of earthquakes; A. C. Lawson ..... 119
PRELIMINARY report concerning some new ostracoderms from Ohio; J. E. Carman ..... 133
PRESENT status of the geodetic work in the United States and the value to geology; William Bowie..... 74
— — — — Ozarkian nad Canadian systems; E. O. Ulrich..... 134
PRESIDENTIAL address by W. Lindgren, of the Society of Economic Geologists ..... 144
— — — W. D. Matthew: Recent progress and trends in vertebrate paleontology ..... 130, 401
— — — Charles Schuchert: Sites and nature of the North American geosyncline ..... 151
— — — T. L. Walker, of the Mineralogical Society..... 149
PRIMARY chalcocite, Bristol copper mine, Connecticut; A. M. Bateman 146
PRIMATES and man..... 410
PROJECTION apparatus in teaching mineralogy, Use of..... 150
PROCEEDINGS of the Thirty-fifth Annual Meeting of the Geological Society of America, held at Ann Arbor, Michigan, Thursday-Saturday, December 28-30, 1922; Charles P. Berkey, *Secretary*..... 2
— — — Twenty-first Annual Meeting of the Cordilleran Section of the Geological Society of America, held at Stanford University, California, April 29, 1922; A. F. Rogers, *Secretary* ..... 117
— — — Third Annual Meeting of the Mineralogical Society of America, held at Ann Arbor, Michigan, December 29, 1922; F. R. Van Horn, *Secretary pro tempore*..... 147
— — — Fourteenth Annual Meeting of the Paleontological Society, held at Ann Arbor, Michigan, December 28, 1922; R. S. Bassler, *Secretary* ..... 121
— — — Second Annual Meeting of the Society of Economic Geologists, held at Ann Arbor, Michigan, December 28-30, 1922; Sydney H. Ball, *Secretary*..... 143
PROGRESS of mineralogical methods: Presidential address by T. L. Walker ..... 149
PROBLEM of mild geological climates; Ellsworth Huntington..... 81
PYORRHŒA in the Cohoes mastodon; J. M. Clarke..... 127

Page

QUANTITATIVE criteria in paleogeography; R. C. Moore ..... 85
QUARTZITES in the lead region, South Dakota ..... 144
QUATERNARY diastrophism in southern Cebu ..... 59
QUIRKE, T. T.; Boudinage, an unusual structural phenomenon ..... 649
—; Parallel folds and boudinage ..... 59

RANGE and distribution of certain types of Canadian Pleistocene concretions; E. M. Kindle ..... 609
RECENT progress and trends in vertebrate paleontology: Presidential address by W. D. Matthew ... 130, 401
— work in France and Switzerland on the structure of the Alps; Emmanuel de Margerie ..... 56
RECONNAISSANCE traverse from Mojave Ulojane, California, to Rock Creek, Utah; H. E. Gregory ..... 74
RECTILINEAR shorelines of the New England-Acadian region; D. W. Johnson ..... 57
REEDS, C. A.; Banded postglacial clay near New York City ..... 92
REGISTER of the Ann Arbor meeting ... 101
— — — — — of Paleontological Society ..... 136
— — Stanford meeting of Cordilleran Section ..... 120
RELATIONS and overlaps of Ordovician formations in Kentucky and Tennessee; E. O. Ulrich ..... 131
RENICK, B. C.; Correlation of the Pottsville and lower Allegheny formations in western Pennsylvania. 68
REPORT of the Auditing Committee of the Geological Society ..... 55
— — — Committee on the Nomenclature and Classification of Minerals, Mineralogical Society ..... 148
— — — Council of the Geological Society ..... 6
— — — — — — Paleontological Society 123
— — — Editor of the Geological Society ..... 10
— — — — — — Mineralogical Society. 148
— — — Treasurer of the Geological Society ..... 9
— — — — — — Mineralogical Society. 148
— — — — — — Paleontological Society 124
— — Secretary of the Geological Society ..... 6
— — — — — — Mineralogical Society. 148
— — — — — — Paleontological Society 123
— on securities of the Geological Society ..... 56
REPTILIAN fauna of the Permian of Texas and South Africa ..... 403
RESOLUTION of appreciation of E. O. Hovey, retiring Secretary ..... 76
RESTORATION of the Cohoes mastodon; J. M. Clarke ..... 127
RHINOCEROSES of America ..... 134
RICHMOND, Faunal correlations of the. 130
— of the Cincinnati Province, Basal ... 132
RIO GRANDE region, Tertiary stratigraphy in the ..... 75
ROAD materials investigations in Wisconsin; E. F. Bean ..... 146
ROBINSON, H. M., and F. J. FOHS; Structural study of a part of northeast Texas and some stratigraphic sections ..... 70
ROCK alteration in contact with sulphides at Sudbury, Ontario; A. Wandke and R. Hoffman ..... 146
— Creek, Utah, Reconnaissance traverse from ..... 74
— floors in arid regions; A. Locke .... 119

Page

ROCKY Mountains, Building of the southern ..... 285
— — of Idaho and Montana; G. R. Mansfield (printed in this volume under the title "Structure of the Rocky Mountains of Idaho and Montana") ..... 53
— — — — — —, Structure of ..... 263
ROGERS, A. F., *Secretary*; Proceedings of the Twenty-first Annual Meeting of the Cordilleran Section of the Geological Society of America, held at Stanford University, California, April 29, 1922 ..... 117
ROSE City aerolite ..... 97
RUNNER, J. J.; Structural features exhibited by the quartzites in the lead region, South Dakota ..... 144

SALT domes of North America ..... 66
SAND rivers of Texas and California and some of their accompanying phenomena; R. T. Hill ..... 95
SAURISCHIA in Europe later than the Trias ..... 133
— — — since the Triassic ..... 449
SCHALER, W. T.; Uranite group: Autunite, carnotite, sincosite, etcetera 150
SCHOEPITE from the Congo ..... 150
SCHOEWE, W. H.; Origin and history of extinct Lake Calvin, Iowa ..... 93
SCOTT, I. D.; Ice action on inland lakes 92
SCHUCHERT, CHARLES; Sites and nature of the North American geosynclines; Presidential address by. 53, 151
SEA-MILL at Boom Beach, Maine ..... 65
SECRETARY's report, Geological Society. 6
— —, Mineralogical Society ..... 148
— —, Paleontological Society ..... 123
SECURITIES of the Geological Society, Report on the ..... 56
SEDIMENTARY rocks in drill-holes, Fusion of ..... 431
SEDIMENTATION at the mouths of the Mississippi river—preliminary report; A. C. Trowbridge ..... 95
SHALE, Fissility of ..... 63
SHEDD, SOLON; Topography and geology of the Okanogan Highlands and Columbia Plateau of Washington .. 75
SHEPARD, F. P.; Isostasy as a result of earth's shrinkage ..... 62
SHIDELER, W. H.; Some faunal correlations of the Richmond ..... 130
—; The basal Richmond of the Cincinnati province ..... 132
SHORELINES of the New England-Acadian region ..... 57
SHRINKAGE cracks in sediments ..... 64
SILICATES, Volume isomorphism in the 150
SIMILARITIES and contrasts between native copper deposits of New Jersey and of Michigan; J. V. Lewis. 145
SINCOSITE of the uranite group ..... 150
SINGEWALD, J. T., JR.; Genetic comparison of the Michigan and Bolivian copper deposits ..... 145
SITES and nature of the North American geosynclines: Presidential address by Charles Schuchert .... 53, 151
SNAKE Creek fossil quarries, Correlation of faunas of ..... 131
SNYDER Creek shales, Evolution of *Strophecdonta demissa* (Conrad) in 134
SOME considerations relating to the origin and history of the Lake Superior syncline; W. O. Hotchkiss. 145
— criteria used in recognizing active faults; Stephen Taber ..... 661
— faunal correlations of the Richmond; W. H. Shideler ..... 130

Page

SOME structural features of northern Idaho; J. P. Umpleby..... 66
——— the plains area of Alberta caused by Pleistocene glaciation; O. B. Hopkins..... 82, 419
SOOKE formation, Fauna of the..... 118
——— of southern Vancouver island; Bruce Clark and Ralph Arnold... 134
SOUTH African lavas..... 97
— Africa, Reptilian fauna of Permian of..... 403
SOLVENTS and precipitants in the Michigan copper lodes; A. C. Lane..... 100
——— of metallic copper; A. C. Lane 144
SOUTH DAKOTA, Quartzites in the lead region of..... 144
SPRING Mountain Range of southern Nevada, Structure of..... 89
STANDING committees of Geological Society, Election of..... 12
STOCK, C., and J. C. MERRIAM; Pleistocene vertebrates from an asphalt deposit near McKittrick, California 119
STONY Creek, Connecticut, granite, xenoliths in the..... 96
STOSE, G. W., and ANNA I. JONAS; Ordovician overlap in the Piedmont Province of Pennsylvania and Maryland..... 67, 507
STRATIGRAPHY of central Oregon..... 129
——— the Snake Creek fossil quarries and the correlation of the faunas; W. D. Matthew..... 131
STROMBERG lavas of South Africa; Fred. E. Wright..... 97
*Strophecodonta demissa* (Conrad), Evolution of..... 134
STRUCTURAL features exhibited by the quartzites in the lead region, South Dakota; J. J. Runner..... 144
——— of the Colorado Plateau and their origin; R. C. Moore..... 88
— study of a part of northeast Texas with some stratigraphic sections; F. J. Fohs and H. M. Robinson... 70
STRUCTURE of the Rocky Mountains in Idaho and Montana; G. R. Mansfield..... 263
——— Spring Mountain range, Southern Nevada; D. F. Hewett..... 89
STUDY of the igneous rocks of Ithaca, New York, and vicinity; J. H. C. Martens..... 99
SUCCESSFUL method of teaching historical geology; G. H. Chadwick..... 67
SUDBURY, Ontario, Rock alteration at.. 146
SUGGESTED explanation of the high ferric content of limestone contact zones; B. S. Butler..... 146
SULPHIDES at Sudbury, Rock alteration in contact with..... 146
— in limestone..... 149
SWITZERLAND, Recent geological work in Alps of..... 56
SYMPOSIUM on the structure and history of mountains and the causes of their development..... 53, 151, 380
SYNCLINE of Lake Superior, Origin of.. 145

TABER, STEPHEN; Criteria for the recognition of active faults..... 58
—; Some criteria used in recognizing active faults..... 661
TARR, W. A.; A high temperature vein in Madison County, Missouri..... 99
TEACHING diagram for igneous rocks... 97
TEMPLE Hill mastodon; J. M. Clarke.. 127
TENNESSEE, Embayments and overlaps in central..... 132
—, Ordovician formations in..... 131
TERTIARY diastrophism in southern Cebu 59

Page

TERTIARY origin of Missouri River channel through North Dakota..... 469
— stratigraphy in the lower Rio Grande region; A. C. Trowbridge..... 75
— terrace plains of middle Atlantic Coastal Plain..... 91
TEXAS, Cretaceous of..... 72
—, Geographic nomenclature of..... 67
—, Permian faunas of..... 403
—, Sand rivers of..... 95
—, Stratigraphic sections in northeast. 70
THE Appalachians; Arthur Keith (printed in this volume under the title "Outlines of Appalachian structure")..... 53
— Asiatic arcs; W. H. Hobbs..... 243
— basal Richmond of the Cincinnati Province; W. H. Shideler..... 132
— Burton Dictyosponge; J. M. Clarke. 127
— Homestake orebody; Sidney Paige.. 144
— Lake Superior geosyncline; W. O. Hotchkiss..... 669
— Lance problem; Freeman Ward..... 71
— problem of fossil multilamellar invertebrates; R. S. Bassler..... 133
— theory of mountain structure recently set forth by Professor Kober, of Vienna; C. R. Longwell (printed in this volume under the title "Kober's theory of orogeny")..... 53
— work of Joseph Barrell on problems in sedimentation; Thomas Wayland Vaughan..... 28
THOMSON, ELLIS; Mineralography as an aid to milling..... 149
THOMSONITE, Composition of..... 150
THWAITES, F. T.; Paleozoic rocks found in deep wells in Wisconsin and northern Illinois..... 73
TILTON, J. L.; Observations on coal swamps in northern West Virginia where Permian conditions prevail. 72
TIMPAS limestone and Carlile shale, Merging of..... 495
——— of Colorado..... 74
TITANIFEROUS iron ores of western North Carolina; W. S. Bayley.... 146
TODD, J. E.; Is the channel of the Missouri River through North Dakota of Tertiary origin?..... 469
—, Memorial of..... 44
TOLMAN, C. F.; Geology of the Alamo mining district, Baja California, Mexico..... 119
TOPOGRAPHY and geology of the Okanogan Highlands and Columbia Plateau of Washington; Solon Shedd. 75
TRANSVAAL, Geological map of the Bushveld complex..... 95
TREASURER'S report, Mineralogical Society..... 148
———, Paleontological Society..... 124
———, Geological Society..... 9
TRIASSIC reptilian fauna of Germany.. 405
—, Saurischia in Europe since the..... 449
TROWBRIDGE, A. C.; Sedimentation at the mouths of the Mississippi River—preliminary report..... 95
—; Tertiary stratigraphy in the lower Rio Grande region..... 75
TROXELL, E. S.; American rhinoceroses and the evolution of Diceratherium 134
TSIN-LING-SHAN, Geological sketch of the..... 119
TWENHOFEL, W. H.; Development of shrinkage cracks in sediments without exposure to the atmosphere... 64

UGLOW, W. L.; Cretaceous age and early Eocene uplift of a peneplain in southern British Columbia.. 99, 561

Page

ULRICH, E. O.; Present status of the Ozarkian and Canadian systems... 134
—; Relations and overlaps of Ordovician formations in Kentucky and Tennessee ..... 131
UMPLEBY, J. P.; Some structural features of northern Idaho..... 66
URANITE group: Autunite, carnotite, sincosite, etcetera; W. T. Schaler. 150
USE of projection apparatus in teaching certain phases of mineralogy; E. H. Kraus..... 150
UTAH, Jurassic dinosaurs of..... 405
—, Physiography of the Paria River Valley ..... 94
—, Reconnaissance traverse from Rock Creek ..... 74

VANADIUM deposits of the southwest African protectorate; C. Palache.. 150
VANCOUVER island; Sooke formation of. 134
VAN ESBROECK, A. B.; New teaching diagram for igneous rocks..... 97
VAN HORN, F. R., *Secretary pro tempore;* Proceedings of the Third Annual Meeting of the Mineralogical Society of America, held at Ann Arbor, December 29, 1922..... 147
VAN ORSTRAND, C. E.; Notes on isostasy 300
VAN TUYL, F. M., and G. W. MACHAMER; Physical history of the Colorado Front Range..... 87
VAUGHAN, THOMAS WAYLAND; The work of Joseph Barrell on problems in sedimentation ..... 28
VERDE River lake beds, near Clarkdale, Arizona; O. P. Jenkins..... 119
VENERICARDIA, West coast Eocene..... 118
VERTEBRATE paleontology, Recent progress and trends in..... 130, 401
VOLUME isomorphism in the silicates; E. T. Wherry..... 150
VOMER-PARASPHENOID question, Contribution to the..... 133, 459
VON HUENE, F.; Carnivorous saurischia in Europe later than the Trias 133, 449
—; Contribution to the vomer-parasphenoid question..... 133, 459
—; Lines of phyletic and biological development of the Ichthyopterygia. 133, 463
VOTE of thanks to Walter F. Hunt.... 87

WALKER, T. L., and A. L. PARSONS; Ellsworthite, new hydrous uranium columbite from Hybla, Hastings County, Ontario..... 150
—; Crystallography and optical properties of a uranium mineral (schoepite) from the Congo..... 150
—; Progress of mineralogical methods; Presidential address by..... 149

Page

WANDKE, A., and R. HOFFMAN; Rock alteration in contact with sulphides at Sudbury, Ontario..... 146
WARD, FREEMAN; The Lance problem.. 71
WASHINGTON, Geology of Okanogan Highlands and Columbia Plateau of 75
—, Glacial drainage on Columbia Plateau of..... 92
WASHINGTON, H. S.; Occurrence of leucite in the Alban Hills..... 150
WATER and oil, Capillary relations of.. 100, 145
WATSON, T. L.; Native copper deposits of the southern Atlantic States as compared with those of Michigan. 145
WELLS, R. C.; Chemical suggestions concerning the origin of Lake Superior copper ores..... 100, 144
WENTWORTH, C. K.; Late Tertiary and Pleistocene terrace plains of the middle Atlantic Coastal Plain.... 91
WEST Coast Eocene, Venericardia..... 118
— —, New genus of Pelecypoda from marine Oligocene of..... 118
WEST VIRGINIA, Coal swamps in..... 72
WHERRY, E. T.; Composition of Thomsonite ..... 150
—; Volume isomorphism in the silicates 150
WHITE, DAVID; Mother plants of petroleum ..... 145
WILLIAMS, J. S., and E. B. BRANSON; Evolution of *Stropheodonta demissa* (Conrad) in the Snyder Creek shales of Missouri..... 134
WILLIS, BAILEY; Coast Ranges and Sierra Nevada..... 53
—; Criteria by which to determine the direction of faults..... 144
—; Dynamics of faulting and folding.. 58
—; Faults of the Coast Ranges of California ..... 58
—; Possible continental links..... 120
WISCONSIN, Copper-bearing rocks of... 145
—, Paleozoic rocks found in deep wells in ..... 73
—, Road materials investigation in.... 146
WOODWORTH, J. B.; Cross-section of the Appalachians in southern New England ..... 253
—; Eastern Appalachians in the latitude of southern New England... 53
WRIGHT, FRED. E.; Metamorphism of quartzites by the Bushveld igneous complex ..... 96
—; Stormberg lavas of South Africa.. 97
WYOMING and Colorado oil-bearing rocks, Correlation of..... 145

XENOLITHS in the Stony Creek, Connecticut, granite; J. F. Kemp.... 96